

# BULLETIN

## OF THE INSTITUTE OF METALS

VOLUME 4

DECEMBER 1957

PART 4

### INSTITUTE NEWS

#### Informal Discussion on "Fuel Efficiency in the Melting and Thermal Treatment of Metals"

Under arrangements made by the Metallurgical Engineering Committee, an all-day Discussion on "Fuel Efficiency in the Melting and Thermal Treatment of Metals" will be held

#### *As Overseas Sustaining Member*

INTERNATIONAL NICKEL COMPANY, INC., THE, 67 Wall Street, New York 5, U.S.A.

#### *As Ordinary Members*

BERNHARDT, Lawrence, B.Sc., A.M.I.Mech.E., Mechanical Engineer, Copper Development Association, 55 South Audley St., London, W.1.



AUTUMN MEETING, GLASGOW

A very successful and well-attended meeting of the Institute took place in Glasgow on 16-20 September. The photograph, taken at the Civic Reception held in the City Hall, shows (left to right): Mr. Matthew Hay (*Hon. Secretary, Scottish Local Section*), Mrs. Hay, Lady McCance, Mrs. Pfeil, Dr. L. B. Pfeil (*President*), Bailie John Blackwood (*Senior Magistrate of Glasgow*), Mrs. Blackwood, Dr. H. Harris (*Chairman of the Scottish Local Section*), Mrs. Harris, Mrs. Guilan, Lieut.-Colonel S. C. Guilan (*Secretary*).

at the College of Technology, Gosta Green, Birmingham, on Wednesday, 26 February next, beginning at 10.30 a.m.

Opening addresses will be given by Mr. F. C. ASHEN of Imperial Chemical Industries, Ltd., Metals Division, and Mr. P. F. HANCOCK, Technical Director, Birlec, Ltd., Birmingham.

Visitors will be welcome; tickets will not be required.

#### Election of Members

The following 1 Overseas Sustaining Member, 33 Ordinary Members, 5 Junior Members, and 34 Student Members were elected on 8 November 1957:

BOWCOTT, Harold Joseph, F.R.I.C., Senior Experimental Officer, Post Office Engineering Department, Fordrough Lane, Birmingham 9.

COLLONGUES, Robert, Doct. ès Sc., Maître de Recherches, Centre d'Etude de Chimie Métallurgique du Centre National de la Recherche Scientifique, 15 rue Georges Urbain, Vitry-sur-Seine, France.

COPP, Warren Franklin, B.S.Cer., Director, Metallurgy and Development, Wheeling Steel Corp., Wheeling, W. Va., U.S.A.

GROUND, Donald Morley, L.I.M., Lecturer in Metallurgy, South East Essex Technical College, Dagenham, Essex.

# INSTITUTE NEWS

- HAAS, Boris Franz René, Ing., BMW Studiengesellschaft für Triebwerksbau G.m.b.H., Aussere Dachauerstrasse, München 68, W. Germany.
- HERNANZ BIANCO, *Professor* José Luis, Works Manager, Factoría de Villaverde, Manufacturas Metálicas Madrileñas S.A., Apartado No. 2, Villaverde Alto, Madrid, Spain.
- HIGGINBOTTOM, Alec, A.Met., L.I.M., Research Assistant, Stewarts and Lloyds, Ltd., Corby, Northants.
- HILL, Terence Michael, A.Met., Assistant Chief Research Officer, Firth-Brown Tools, Ltd., Sheffield 4.
- JOHNSON, Oscar G., B.Ch.E., Metallurgist, Axelson Manufacturing Co., Division of U.S. Industries, Inc., P.O. Box 58335, Vernon Station, Los Angeles 58, Calif., U.S.A.
- JOHNSON, William R., B.S., Chief Research Metallurgist, Associated Spring Corp., Bristol, Conn., U.S.A.
- KAY, Alfred Ernest, B.Sc., Ph.D., Principal Scientific Officer, Atomic Weapons Research Establishment, Aldermaston, Berks.
- KNOTEK, Otto Bruno Max, Dipl.-Ing., Dr. Techn., Gebr. Böhler & Co. A.G., Hansa-Allee 321, Düsseldorf-Oberkassel, Germany.
- LEIDHEISER, Henry, Jr., M.S., Ph.D., Assistant Director, Virginia Institute for Scientific Research, 326 North Boulevard, Richmond 20, Va., U.S.A.
- MORCOM, Alfred Rupert, B.A., D.Sc.Tech., C.I.Mech.E., Research Director, Belliss and Morcom, Ltd., Ledsam Street, Birmingham 16.
- MORGAN, Victor Thomson, A.I.M., Chief Chemist, Bound Brook Bearings, Ltd., Trent Valley Trading Estate, Lichfield, Staffs.
- PASTON-GREEN, John Henry Richard, A.I.E.E., D.M.M. (Machinery), Ltd., 66 Victoria Street, London, S.W.1.
- PIETROKOWSKY, Paul, M.S., Research Engineer, Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena 10, Calif., U.S.A.
- REDDY, Richard Lyons, M.S., Ph.D., Metals Research Laboratories, Electro Metallurgical Co., P.O. Box 580, Niagara Falls, N.Y., U.S.A.
- RODRIGUES, *Professor* Antonio José Andriano, O.B.E., Professor of Metallurgy and Metallography, Faculty of Engineering, Universidade do Oporto, Portugal.
- ROTH, Walter, Dr.Ing., Research Laboratory, Vereinigte Leichtmetallwerke, Bonn-am-Rhein, Germany.
- RUTHARDT, Konrad, Dr.Phil., Generalbevollmächtigter und Gesellschafter, W.C. Heraeus G.m.b.H., Platinschmelze, Hanau/Main, Germany.
- RUTKOWSKI, Wladyslaw, Mgr. Inz. Docent, Dyrektor Naukowy, Instytut Metali Niezależnych, 11 Sobieskiego, Gliwice, Poland.
- SCHEY, John Anthony, Dipl.Ing., Research Metallurgist, The British Aluminium Co., Ltd., Chalfont Park, Gerrards Cross, Bucks.
- SCHULZE, *Professor* Gustav Ernst Robert, Dr.phil., Dr.phil. habil. Professor und Direktor, Institut für Röntgenkunde und Metallphysik, Technische Hochschule, Dresden, Germany.
- SEDLACZEK, *Professor* Herbert Joh., Dr.-Ing., Ordentlicher Professor und Direktor, Institut für bildsame Formgebung, Rheinisch-Westfälische Technische Hochschule, Aachen, Germany.
- SHERBY, Oleg D., Ph.D., Scientific Liaison Officer, U.S. Office of Naval Research, 429 Oxford St., London, W.1.
- SLONAKER, Robert E., Jr., M.S., Assistant Professor of Chemical Engineering, Bucknell University, Lewisburg, Pa., U.S.A.
- SMITH, *Professor* George V., Sc.D., Professor and Assistant Director, Metallurgical Engineering, School of Chemical and Metallurgical Engineering, Cornell University, Olin Hall, Ithaca, N.Y., U.S.A.
- STEINEGGER, Alfred Friedrich, Ing., Metallurg, Reaktor A.G., c/o Escher-Wyss A.G., Hardstrasse 319, Zürich, Switzerland.
- TAYLOR, Robert Rowe, Senior Metallurgist, Sintered Metal Department, Morgan Crucible Co., Ltd., 52 Battersea Church Road, London, S.W.11.
- WECK, Richard, Ph.D., A.M.I.C.E., A.M.I.Mech.E., Director of Research, The British Welding Research Association, 29 Park Crescent, London, W.1.
- WEISSE, Ernst, Dr.Ing., Zivilingenieur, Klingerplatz 6, Hannover, Germany.

## As Junior Members

- BOLLING, Gustaf Fredric, M.A.Sc., Ph.D., Research Metallurgist, Department of Physical Metallurgy, University of Birmingham.
- DIXON, Kenneth, Mechanical Engineer, High Duty Alloys, Ltd., Winscales, Workington, Cumberland.
- GOLDENBAUM, Paul, L.I.M., Assistant Chemist, Langley Alloys, Ltd., Langley, Slough, Bucks.
- HUNTER, Donald Brian, L.I.M., Assistant Technical Officer, Research Department, Imperial Chemical Industries, Ltd., Metals Division, Kynoch Works, Birmingham 6.
- SMART, Robert Fyffe, B.Sc., A.R.T.C., Research Metallurgist, Tin Research Institute, Fraser Road, Greenford, Middx.

## As Student Members

- ALLISON, (Miss) Judith Yvonne, B.A., Research Metallurgist, Aluminium Laboratories, Ltd., Banbury, Oxon.
- ANDERSON, Eric, B.Sc., Department of Metallurgy, University Museum, Parks Rd., Oxford.
- BARKER, William, Undergraduate, Metallurgy Department, University College of Swansea.
- BLACKWELL, George Peter, Undergraduate, Department of Metallurgy, University College of Swansea.
- COWLIN, John Barrington, Undergraduate, Department of Metallurgy, University College of Swansea.
- DAVIES, David Emrys, Undergraduate, Department of Metallurgy, University College of Swansea.
- DAWSON, (Miss) Zoë Sarah Luck, Undergraduate, Department of Metallurgy, University of Nottingham.
- EADE, Graham Arthur, Undergraduate, Department of Metallurgy, University Museum, Parks Rd., Oxford.
- EVANS, William David, Undergraduate, Department of Metallurgy, University College of Swansea.
- FINNEY, Ernest David, Undergraduate, Department of Metallurgy, King's College, Newcastle-upon-Tyne.
- GILL, Laurance Leslie, Undergraduate, Department of Metallurgy, University of Sheffield.
- HEAP, David Anthony, Undergraduate, Department of Metallurgy, University of Nottingham.
- HILL, Brian, Undergraduate, Department of Metallurgy, University College of Swansea.
- HINCHLIFFE, Arthur Anthony, Undergraduate, Department of Metallurgy, King's College, Newcastle-upon-Tyne.
- HUGHES, Edward Joseph, Undergraduate, Department of Physical Metallurgy, University of Birmingham.
- JONES, Donald William, B.Sc., Research Student, Department of Physical Metallurgy, University of Birmingham.
- KAUFMANN, Aubrey, Undergraduate, Department of Metallurgy, King's College, Newcastle-upon-Tyne.

## PERSONAL NOTES

LANGFORD, Donald Arthur, Undergraduate, Department of Metallurgy, University of Nottingham.

OGG, Anthony Frederick, Undergraduate, Department of Metallurgy, University College of Swansea.

PHILLIPS, Trefor Garfield, Undergraduate, Department of Physical Metallurgy, University of Birmingham.

PLUMTREE, Alan, Undergraduate, Department of Metallurgy, University of Nottingham.

REYNOLDS, Geoffrey Laurence, Undergraduate, Department of Metallurgy, University College of Swansea.

RIVLIN, Vivian Gerald, B.A., Research Student, Department of Metallurgy, University Museum, Parks Rd., Oxford.

SPICK, Peter Thomas, Undergraduate, Department of Metallurgy, University of Nottingham.

SREE HARSHA, Karnamadakaia Sreenivasa Acharlu, B.Sc., D.I.I.Sc.(Met.), Research Student, Department of Metallurgy, Indian Institute of Science, Bangalore 3, India.

THOMAS, Alan John, Student of Metallurgy, University College of Swansea.

WELCH, Edward Hector, L.I.M., Student, Battersea College of Technology, London, S.W.11.

WELLS, Philip, Undergraduate, Department of Metallurgy, University of Sheffield.

WILKINS, Brian John Samuel, Student, Battersea College of Technology, London, S.W.11.

WILSON, Francis Gerard, Undergraduate, Department of Metallurgy, University of Liverpool.

WOOLMINGTON, Kenneth Graham, B.A., Harwell Research Student, Department of Metallurgy, University Museum, Parks Rd., Oxford.

WORTHINGTON, Peter John, B.Sc., Postgraduate Student, Department of Metallurgy, University of Sheffield.

WRAY, Peter John, B.Sc., Junior Research Metallurgical Engineer, Metals Research Laboratory, Carnegie Institute of Technology, Pittsburgh 13, Pa., U.S.A.

WRIGHT, Maurice Arthur, Undergraduate, Department of Metallurgy, University College of Swansea.

## PERSONAL NOTES

MR. G. ABOWITZ has been appointed to a General Electric Company Fellowship at Yale University.

PROFESSOR J. G. BALL has been appointed Head of the Department of Metallurgy, Royal School of Mines, in succession to Professor C. W. Dannatt. He will continue as Professor of Physical Metallurgy.

MR. E. C. BRAMPTON has been appointed North Western Area Manager of General Refractories, Ltd., 2 Albert Square, Manchester 2.

MR. A. BURWOOD-SMITH has left the Research Laboratories of The General Electric Co., Ltd., to join the Precious Metals Development and Research Division of The Mond Nickel Co., Ltd., Acton.

MR. E. W. G. CASEWELL has taken up an appointment at Hereford County Technical College.

MR. S. CHINOWSKY is now engaged on research in the Department of Physical Metallurgy, Birmingham University.

MR. G. D. DENYER has joined the staff of Aluminium Laboratories, Ltd., Banbury, as head of the casting section. He was formerly with the Glacier Metal Co., Ltd., Wembley.

MR. L. M. FITZGERALD has left the University of Melbourne and taken up a research scholarship in the Laboratory for the Study of the Physics and Chemistry of Surfaces, Cambridge.

MR. B. G. FOOKES has left Nottingham University, having obtained a Second Class Honours degree in Metallurgy, and is now on the staff of the U.K. Atomic Energy Authority, Industrial Group, Springfield Works, Salwick, near Preston.

DR. J. GARSTONE has left the Atomic Energy Research Establishment and is now at the Swinden Laboratories of the United Steel Companies, Ltd., Rotherham.

MR. P. GAUNT has been appointed Assistant Lecturer in Physics at Sheffield University.

MR. D. W. HALL has been appointed General Works Manager of Low Moor Alloy Steelworks, Ltd., and Yorkshire Rolling Mills, Ltd., Low Moor, Bradford.

MR. N. B. HARVEY has been appointed Development Manager of the Aston Chain and Hook Co., Ltd., in which capacity he will be in charge of all research, development, and laboratory services. Mr. Harvey was formerly Chief Metallurgist to the Company.

DR. J. E. HUGHES is now at the Research Laboratory of Siemens Edison Swan, Ltd., Harlow, Essex.

DR. W. HUME-ROTHERY has been elected an Honorary Life Member of the American Society for Metals.

MR. V. B. JOHN has left the Royal Air Force and has taken up an appointment with the South Wales Aluminium Co., Ltd.

PROFESSOR P. LACOMBE has returned to the Ecole Nationale Supérieure des Mines, Paris, after spending two months as Visiting Professor of Physical and Nuclear Metallurgy at the Comisión Nacional de Energía Atómica, Buenos Aires.

MR. R. OLIVER has left the Production Engineering Research Association to become Head of the Metals Development Department of The General Electric Co., Ltd., Wembley, Middlesex.

DR. H. M. OTTO has left Birmingham University and is now at the Research Institute for Advanced Study, Baltimore, Md.

PROFESSOR C. PANSERI, Director of the Istituto Sperimentale dei Metalli Leggeri, Milan, has been awarded the Guido Donegani Gold Medal of the Associazione Italiana di Metallurgia.

MR. K. C. RANDLE has left Rolls-Royce, Ltd., and taken up an appointment at the titanium plant of Imperial Chemical Industries, Ltd., Waunarlwydd, South Wales.

MR. J. SALTER has been appointed General Production Manager and a Director of The British Aluminium Co., Ltd.

PROFESSOR DR. ERICH SCHMID, Corresponding Member to the Council for Austria, has been awarded the Heyn Medal of the Deutsche Gesellschaft für Metallkunde.

MR. R. H. SEEBOHM has left Cambridge and is now working in the Department of Metallurgy, Oxford.

DR. R. J. STOKES has left the University of California and is now a Senior Research Metallurgist with the Minneapolis-Honeywell Regulator Co., Hopkins, Minn.

DR. A. L. SUTTON has left the Research Laboratories of The General Electric Co., Ltd., and joined the staff of the U.K. Atomic Energy Authority, Industrial Group, Research and Development Branch, Culcheth, near Warrington.

MR. D. THACKER has left the Nottingham and District Technical College to become Senior Lecturer in Metallurgy at the Sheffield College of Technology.

PROFESSOR FRANZ WEVER, Director of the Max-Planck-Institut für Eisenforschung, Düsseldorf, has been awarded the Grosse Verdienstkreuz des Verdienstordens of the Federal German Republic, in recognition of his services to ferrous metallurgy.

MR. F. E. WHITE has left England to take up an appointment in the Research Laboratories of the International Nickel Co., Inc., Bayonne, N.J.

DR. J. WILCOCK has been appointed Lecturer in Industrial Metallurgy at Birmingham University.

### Death

The Editor regrets to announce the death of

DR. PAUL D. MERICA, a former President of the International Nickel Co., Inc., on 20 October 1957, aged 69. He was a Platinum Medallist of the Institute.

## OBITUARY

### Dr. R. W. Bailey

Dr. Richard William Bailey, who had retired from active duties as Consultant to the Research Department of the Metropolitan-Vickers Electrical Co., Ltd., in March last, died on 4 September 1957. He had relinquished executive duties in 1945 to give more time to special research and development work and to act as Consulting Research Engineer.

Dr. Bailey, who was born at Romford in 1885, first joined the company (then British Westinghouse) as a college apprentice in 1907, after serving his apprenticeship at the Great Eastern Railway Company's Locomotive Works, Stratford, and taking an electrical engineering course at the City and Guilds Central Technical College, South Kensington.

During a temporary break with industry, he became a lecturer in mechanical engineering at the Battersea Polytechnic, and in 1912 was appointed as the first Principal of the Crewe Technical Institute (now Technical College). In 1919 he accepted an invitation to return to Metropolitan-Vickers to take charge of the Chemical Laboratory of the Research Department, concerned with the chemical, mechanical, and metallurgical testing of the materials used by the Company.

Thus began the work on the properties of materials with which his name was to become associated, not only in the setting up of a comprehensive testing and inspection organization, but in the field of original research. Dr. Bailey is named as the inventor on some eighty-eight British patents and as the author of thirty-five published papers.

One of his chief interests lay in the production of materials suitable for use at elevated temperatures and in determining safe working stresses at operating temperatures above the range where the elastic theory could be relied upon. This

work focused attention on what became known as the phenomenon of "creep". In 1924 an extensive programme of research was initiated in connection with creep, embrittlement, and related phenomena. In a paper to the Institute of Metals in 1926 he drew attention to the possible importance of strain-hardening and simultaneous partial softening by annealing, as a basis for explaining the mechanism of creep; and the disastrous effects on creep rate of spheroidization in steels were suggested in a paper to the 1929 World Power Conference at Tokyo and confirmed by later work.

The development of methods of creep testing, and of the application of the data obtained to design and to the production of improved materials of construction, in particular alloy steels, established Bailey's reputation as a world authority on creep.

Dr. Bailey was awarded the degree of D.Sc. (Eng.) by London University in 1936 for his published work relating to the principles of design, behaviour, and properties of metals at elevated temperatures. He was also awarded the Thomas Hawksley Premium in 1929 and the Thomas Hawksley Gold Medal in 1935 by the Institution of Mechanical Engineers. He became an Associate member of that Institution in 1922, a full member in 1936, and served as President in 1954. In 1951 he was elected a Fellow of the Royal Society and served on the Society's Council in 1951-52. He was a member of many technical committees and was particularly well known for his contributions to the work of the British Standards Institution, the Institution of Mechanical Engineers, and the British Electrical and Allied Industries Association. He joined the Institute of Metals in 1924.

Approachable and unassuming, with a genial disposition, Dr. Bailey had many friends, both in private life and in scientific circles.

## LETTER TO THE EDITOR

### Fracture in Creep

Recently, McLean<sup>1</sup> has described two distinct types of cracking which can occur in a metal stressed under creep conditions: (a) tripoint cracking, at high strain rates, and (b) cavity formation, at low strain rates. An estimate of the stress at which the transition between the two types of fracture process takes place was obtained by the application of Stroh's<sup>2</sup> theory. A similar relationship can be arrived at by considering the relaxation of stressed grain boundaries causing stress concentrations at the ends of the relaxed zones.

Thus, consider a grain boundary inclined at  $45^\circ$  to the applied tensile stress; the shear stress acting on it is a maximum and the effect of any tensile forces acting perpendicular to the plane of the boundary, and therefore not causing stress concentration, may be neglected. During creep, relaxation occurs in the vicinity of this boundary and sliding tends to take place on it. An estimate of the order of magnitude of the stress concentration resulting from this relaxation can be obtained from the work of Inglis<sup>3</sup> on the computation of shear stress due to cracks. Applying these ideas, Zener<sup>4</sup> showed that if the relaxed region is in the shape of a disc and the applied forces result in shear stresses in the plane of the disc, with no normal tensile stresses, the strains in the surrounding elastic region will be precisely the same as if the viscous region had been a crack-like cavity. If the radius of the disc

is  $\frac{1}{2}L$  and the radius of curvature of the edge of the crack is  $t$ , then :

Maximum tensile stress at the edge of the crack

$$= \sqrt{\frac{L}{2t}} \times \text{overall shear stress}$$

if  $L$  is large compared with  $t$ . Thus the stress at the end of a relaxed boundary is :

$$\sigma' = \sqrt{\frac{L}{2t}} \times \sigma \quad \dots \quad (1)$$

where  $L$  = length of slipping interface,  $2t$  = thickness of relaxed zone in vicinity of boundary, and  $\sigma$  = shear stress on boundary.

The critical stress  $\sigma_c$  for a crack of radius  $t$  to form at the end of the relaxed zone is obtained by equating to zero the derivative with respect to  $t$ , of the total energy change on forming the crack. This gives :

$$\sigma_c^2 t = 4(1 + \nu)G\gamma \quad \dots \quad (2)$$

where  $\nu$  is Poisson's ratio,  $G$  is the shear modulus, and  $\gamma$  is the new surface energy per unit area of the surface of the crack formed.

Thus from (1) :

$$\sigma^2 = 8(1 + \nu) \frac{G\gamma}{L}$$

This is an expression differing only slightly in the constant from that of McLean, which has been shown to give results of the correct order of magnitude using available data.

P. W. DAVIES

University College,  
Swansea.

#### REFERENCES

1. D. McLean, *J. Inst. Metals*, 1956-57, **85**, 468.
2. A. N. Stroh, *Proc. Roy. Soc.*, 1954, [A], **223**, 404.
3. C. E. Inglis, *Trans. Inst. Naval Architects*, 1913, **55**, (1), 219.
4. C. Zener, "Elasticity and Anelasticity of Metals", p. 129. 1948: Chicago (University of Chicago Press).

## NEWS OF LOCAL SECTIONS AND ASSOCIATED SOCIETIES

### Official Visits by the President and Secretary

The President (Dr. L. B. PFEIL, O.B.E., F.R.S.) hopes to pay official visits to the Local Sections on the dates given below. He will be accompanied by the Secretary :

Date.	Local Section.	Date.	Local Section.
9 Jan.	Birmingham.	6 Feb.	London.
14 Jan.	South Wales.	10 Feb.	Scottish.
4 Feb.	Oxford.		

## NEWS OF KINDRED SOCIETIES

### Institution of Metallurgists

The Council of the Institution of Metallurgists announces that Dr. A. D. MERRIMAN, who has been Registrar-Secretary for the past ten years, is to retire on 31 December 1957. He will be succeeded by Mr. R. G. S. LUDLAM, who has been Assistant Registrar in the University of Leeds since 1951.

## OTHER NEWS

### Discussion on the Teaching of Corrosion Science

A discussion on the teaching of the science of metallic corrosion has been arranged by the Corrosion Group of the Society of Chemical Industry and will take place at 14 Belgrave Square, London, S.W.1, on Wednesday, 18 December 1957, from 2.30 to 4.00 and from 4.45 to 6.30 p.m.

The first part of the discussion, opened by Mr. L. W. Stubbs, will relate to the facilities at present available in Universities and Technical Colleges; the second part, opened by Dr. T. P. Hoar, will be concerned with future developments. The meeting is open to all, and no tickets are required.

### Applied Thermodynamics for Metallurgists and Chemists

A course of ten lectures on "Applied Thermodynamics for Metallurgists and Chemists" is to be given at the Battersea College of Technology by Dr. O. Kubaschewski (Senior Principal Scientific Officer at the National Physical Laboratory). The lectures will be held on successive Wednesday evenings (from 7 to 9 p.m.), beginning on 8 January.

The purpose of the course is to show how thermodynamics can be applied to practical problems in metallurgy and chemistry. Some knowledge of the concepts and methods of physical chemistry is essential, but the student will not be expected to have a profound knowledge of thermodynamics.

The fee for the course is £1. Applications for admission should be made to The Secretary (A/T Course), Battersea College of Technology, London, S.W.11.

### Chair of Chemical Metallurgy

The International Nickel Company, Inc., has established a Chair in Chemical Metallurgy at Columbia University. The Chair is endowed by a grant of \$350,000 and the company has made a gift of \$75,000 for special expenditures incidental to the establishment.

In making the grant, Henry S. Wingate, President of International Nickel, explained that the company wished to support fundamental research in the surface chemical and physical aspects of many problems in extraction metallurgy.

The Trustees have designated the new Chair as the Stanley-Thompson Chair of Chemical Metallurgy in honour of Mr. R. C. Stanley, Chairman of International Nickel until his death in 1951, and Dr. J. F. Thompson, his successor; both were outstanding alumni of Columbia's School of Mines.

The first professor will be Dr. J. H. Schulman, O.B.E., of Cambridge University, a Fellow of Trinity Hall and Reader in Surface Chemistry.

### International Congress on Vacuum Techniques

The First International Congress on Vacuum Techniques will be held in Namur (Belgium) from 10 to 13 June 1958. This congress is officially sponsored by the Commissariat General of the Belgian Government and is to be held in association with the Brussels 1958 International and Universal Exhibition.

The following main subjects will be dealt with: (1) problems related to the scientific basis of vacuum techniques; (2) means of obtaining and measuring high and ultra-high vacua; (3) applications of vacuum techniques in pure and

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applied research (including nuclear sciences and nuclear engineering); and (4) applications of vacuum techniques in metallurgy, chemical industry, pharmaceutical industry, plastics industry, electronic industry, optical industry, and food industry.

Those who wish to attend this congress or receive more detailed information should write to the President of the Executive Committee, Professor Dr. E. THOMAS, c/o CSN/ERM, 30, avenue de la Renaissance, Brussels 4 (Belgium), who will send a circular and a questionnaire.

### Symposium on Nuclear Energy

A Symposium on Nuclear Energy, arranged by the Institution of Chemical Engineers, will be held on Tuesday, 21 January 1958, at Church House, Great Smith Street, London, S.W.1, beginning at 9.30 a.m.

The proposed programme is as follows:

- "The Commissioning and Operation of Calder Hall", by H. G. Davey.
- "Fission Product Disposal", by K. Saddington.
- "Nuclear Criticality: A Novel Factor in the Development of Processes, and the Design and Operation of Plant", by C. M. Nicholls and A. Gillieson.
- "The Marcoule Plutonium Plant", by R. Galley.
- "Processing Problems of the Homogeneous Aqueous Reactor", by I. Wells and E. Lofthouse.
- "The Experimental Approach to the Development of Solvent Extraction Processes", by A. S. White.
- "Computation of the Performance of a Multi-component Solvent Extraction System: Separation of Uranium and Plutonium from Fission Products by Tributyl Phosphate", by J. A. Williams and J. T. Wood.

Registration forms and further details are obtainable from the Secretary, Institution of Chemical Engineers, 16 Belgrave Square, London, S.W.1. The Symposium is open to members of all societies belonging to the British Nuclear Energy Conference.

## DIARY

### The Institute

- 15 January.** "The Mechanism of Clustering and Precipitation in Metals", by Dr. D. Turnbull (Manager of the Chemical Metallurgy Section of the Research Laboratory of The General Electric Company, Schenectady, N.Y.). (17 Belgrave Square, London, S.W.1, at 6.30 p.m.)

### Local Sections and Associated Societies

- 2 January. London Local Section.** "The Technical Control of Some Metal-Working Processes", by Professor A. R. E. Singer. (17 Belgrave Square, London, S.W.1, at 6.30 p.m.)

- 7 January. East Midlands Metallurgical Society.** "The Oil Industry", by J. Collins. (Nottingham and District Technical College, Shakespeare Street, Nottingham, at 7.30 p.m.)
- 7 January. Oxford Local Section.** "Seeing Dislocations." Junior Members' evening. (Cadena Café, Cornmarket Street, Oxford, at 7.0 p.m.)
- 9 January. Birmingham Local Section.** "The Production of Rod and Shapes in Copper and its Alloys", by Dr. N. Swindells. (College of Technology, Gosta Green, Birmingham, at 6.30 p.m.)
- 9 January. Leeds Metallurgical Society.** "Corrosion Problems and Water Treatment in Power Stations", by R. W. Wolforth. (Lecture Room C, Chemistry Wing, The University, Leeds 2, at 7.15 p.m.)
- 9 January. Liverpool Metallurgical Society.** Students' Prize Competition, followed by a visit to the Metallurgy Department of the University. (Joint Meeting with the University of Liverpool Metallurgical Society.) (The University, Liverpool, at 7.0 p.m.)
- 14 January. South Wales Local Section.** "Electron Microscopy", by Dr. J. W. Menter. (Department of Metallurgy, University College, Singleton Park, Swansea, at 6.30 p.m.)

### British Nuclear Energy Conference

- 21 January.** Symposium on Nuclear Energy arranged by the Institution of Chemical Engineers (see this page).

## APPOINTMENTS VACANT

**A METALLURGIST**, aged between 24 and 34, with a degree or equivalent qualification, is required by The Sheffield Smelting Co., Ltd. This post is for development work on a wide range of Precious and Non-Ferrous metals and the person appointed would be called upon for liaison with other industrial concerns. It will be necessary for him to reside in Sheffield and also to attend there for an interview. Apply the Secretary, The Sheffield Smelting Co., Ltd., Royds Mill Street, Sheffield 4.

### POWDER METALLURGY

THE MOND NICKEL CO. LTD. requires a Metallurgist to work in its Birmingham Laboratory with a team engaged in the development of a wide range of nickel-containing materials, using powder-metallurgical techniques. Applicants should possess an honours degree or equivalent qualifications, preferably have experience in the powder-metallurgical field, and be capable of working on their own initiative. Individual publication of results is encouraged.

Salary will be in accordance with experience and qualifications. Pension and assurance schemes are in operation and, in appropriate cases, assistance can be given with housing. Applications, which will be treated in confidence, should give details of age, qualifications, and experience and be addressed to The Manager, Development and Research Department, The Mond Nickel Co. Ltd., Thames House, Millbank, London, S.W.1. Mark envelope "Confidential L.47".